Aeroelastic Uncertainty Analysis Toolbox, Phase I

Completed Technology Project (2008 - 2008)

Project Introduction

Flutter is a potentially explosive phenomenon that is the result of the simultaneous interaction of aerodynamic, structural, and inertial forces. The analytical prediction of flutter in the transonic regime requires high fidelity simulation models that are computationally expensive. Due to the computational demands, traditional uncertainty analysis is not often applied to flutter prediction, resulting in reduced confidence in the results. This Phase I research is aimed at exploring methods to reduce the previous computational time limitations of traditional uncertainty analysis. To dramatically reduce the computational burden of uncertainty analysis, Systems Technology, Inc. proposes to investigate both the coupling of Design of Experiment (DOE) and Response Surface Methods (RSM), and the application of robust stability techniques, namely μ-analysis. Using Reduced Order Models (ROM), the DOE/RSM and μ-analysis approaches will be compared to traditional Monte Carlo based stochastic simulation. The result of the Phase I program will be to demonstrate the utility of the core elements of the Aeroelastic Uncertainty Analysis Toolbox (AUAT). AUAT will contain multiple methods for addressing flutter uncertainty analysis, coupled with a state-of-the-art nonlinear aeroelastic code.

Primary U.S. Work Locations and Key Partners

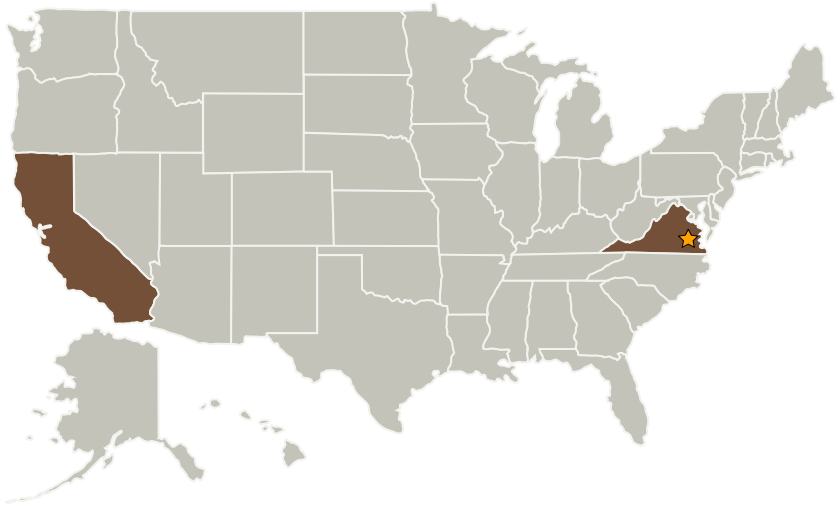

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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Systems Technology, Inc	Supporting Organization	Industry	

Primary U.S. Work Locations	
California	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

David Klyde

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  - TX15.1 Aerosciences
    - TX15.1.3 Aeroelasticity